

ON THE DRILLING OF CAPILLARY HOLES THROUGH THE SKULL, FOR THE PURPOSE OF EXPLORING THE BRAIN WITH A NEEDLE AND SYRINGE.

BY EDMOND SOUCHON, M. D.,

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the Brain with a Needle and Syringe.

(EDMOND SOUCHON, New Orleans, La.)

(READ AT A MEETING OF THE LOUISIANA STATE MEDICAL SOCIETY.)

[Rewritten, with Additions, from the New Orleans Medical
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It is a recognized and accepted surgical practice to explore the brain in doubtful cases, just as the abdomen is explored by exploratory laparotomies in all cases of doubt, when the doubtful points might involve extensive and dangerous surgical procedures.

It has been fully demonstrated, beyond any doubt, particularly by Spitzka, that the penetration of the brain tissues by a hypodermic needle is an innocent operation, very seldom, if ever, followed by serious consequences, when performed under strict antiseptic precautions.

The *modus operandi* heretofore followed consists of applying, under strict antisepsis, a crown of trepan at the suspected spot, and after removing the ring of bone to explore the sub-dural spaces and the brain.

This trephining, though simple enough in itself, is none the less considered by many, even surgeons, as a regular and somewhat lengthy operation, requiring also to be performed by one possessed of some surgical experience, especially of brain surgery.

For these reasons trephining as an exploratory procedure is only seldom used, and when used is very often used too late.

The files of the medical journals and the records of the *post mortem* rooms prove this assertion super-abundantly.

Constantly we read and we hear of chronic abscesses, of cysts, of tumors which have escaped detection during life, or have been diagnosed too late to attempt any surgical operation; or if attempted to give anything of a chance as would have existed had the trouble been located sooner.

Many abscesses and cysts could have been aspirated once or several times and been cured if the magnitude and apprehended complications of an exploratory trephining had not stood in the way.

Fully impressed with the importance of early diagnosis in these cases of brain trouble particularly, it occurred to me that it would be possible to substitute for the apparently formidable application of the trepan, the simpler, readier, less formidable, less dangerous procedure of drilling through the skull a small hole, only large enough to introduce a *large* hypodermic needle.

With this idea in view I proceeded to test it practically on dogs.

All the rules of strict antisepsis and of location of the spots for operation which have to be observed for trephining were followed and strictly adhered to.



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The animals were placed under chloroform specially with the view of controlling them and keeping them perfectly quiet.

The spot to be explored was shaved of its hair by a clip of the point of the scissors, and the place well washed and rendered aseptic.

Then with a sharp-pointed aseptic bistoury a hole was made through the soft parts of the scalp.

Through this the suitable bit of a watchmaker's drill was introduced, and, as soon as it had reached the bone, the instrument was held firmly pressed against it, and the sliding knob of the in-

strument worked, at first slowly, then swiftly, and again slowly as the bit penetrated the bone and came near the brain substance.

The bit is provided with a movable gauge and screw which is adjusted so as to prevent it from penetrating too deeply into the brain tissue.

Any kind of a drill or perforator will do as well.

As soon as the skull has been penetrated the drill is withdrawn and a needle connected with a syringe introduced.

The needle should be *twice as large* at least as the ordinary needle of our cases, so that if it should strike the thick pus of an abscess or the thick fluid of a cyst, the calibre will be large enough to suck it, which it will surely not do if the needle is as fine as the one ordinarily used for a hypodermic injection.

This procedure was performed twice on each side of the middle line of the skull on two dogs.

Each time the needle was driven to the hilt within the tissues, the distance from the point to the hilt being about one inch and a half.

The dogs were afterward left to themselves.

Both recovered rapidly from the effects of the chloroform and behaved as naturally afterward as if their skull and brain had not been perforated four times at different places.

After a rest of two weeks the animals were again put under chloroform, and again the skull and brain were drilled and explored in four places.

The result was exactly the same as at the first sitting. They recovered rapidly.

The dogs were kept about the yard for several weeks to see if any remote effects would develop, but none were noticed.

After the dogs had been driven away they returned several times and never showed anything unusual.

During an experiment one dog was killed before recovering from the chloroform, to see what damage, if any, had been produced. Besides an ecchymotic spot of the size of a nickel under the scalp, and one the size of a pea under the pia mater, nothing else could be seen of the traumatism inflicted.

The greatest advantage of the method is the simplicity of the operation, and on that account the possibility of exploring several points of the brain at the same sitting, instead of being limited to a given area, as in the case of the trephine.

The needle, upon striking a tumor of greater consistency than

the brain substance, would immediately impart the sensation, localization and consistency to the hand of the explorer.

If no such sensation is experienced, then the piston should be worked at different depths to see if there is no fluid tumor at the points explored.

Only in cases of tumors of the same consistency as the brain substance would the procedure yield no information, positive or negative. However, the microscopical examination of the particles sucked by the syringe might give valuable information.

I do not think, in the presence of the great progress of brain surgery, that it is a chimerical idea to say that some day the skull will be drilled in cases of cerebral hæmorrhage, and the blood aspirated here as it is in other situations.

MASTOID AND MEDULLARY ABSCESSSES.

The same technique and remarks apply to the diagnostic of abscesses in the mastoid and anricular regions, and in the medullary cavities of bones.

POST SCRIPTUM.

After the publication of this paper, mention was made of it in the Journal of the American Medical Association (1889, XIII, 345), where, in a following issue (1889, XIII, 431), Dr. Spitzka claimed the priority of the idea for Dr. Paul Gibier.

Upon writing to Dr. Gibier, the author received a reply in which Dr. Gibier says:

“The only reference which I have made to this method was in a communication to the Academy of Sciences, Paris, on hydrophobia, in 1884.

“In it I said: ‘By means of a small perforator (for *inoculation of the virus of hydrophobia in the brain*), I make, on the median line of the skull, an orifice sufficient to admit the introduction of the blunt needle of a Pravaz syringe.

“‘This process is sufficient where small animals, like rats and mice, are inoculated, but when you come to the dog, it is preferable to use the ordinary trephining process.’”

As can be readily seen, the ideas are altogether different.

The writer had never heard of Dr. Gibier’s communication to the Academy of Sciences.

Upon instructing the National Bureau of Medical Bibliography in Washington to make a thorough search in the Library of the

Surgeon General's Office, their report was that nothing even recalling this method could be found up to date, April 15, 1895.

When I quoted Dr. Spitzka above, I did so from abstracts read in some journal, but I had not read his valuable and most remarkable paper. I procured it since, and studied it with all the care and attention which the subject and the name of the author could not fail to arouse in every surgeon.

It is entitled: On Some Points Regarding Therapeutical and Other Injuries of the Brain. (Proceedings of American Neurological Association, 1887. Also in Journal of Nervous and Mental Diseases. Also in Journal of Comp. Med., July, 1886.)

Dr. Spitzka has used drilling and trephination only for the purpose of injecting various substances into the membranes of the brain and into its substance.

We fail to find anywhere in those remarkable experiments anything referring to drilling of holes or trephination, with insertion of a needle and syringe for *diagnostic purposes*, which is my great aim.

In one case an exploration was made with a hypodermic syringe, but *after trephining*.

This case deserves more than passing notice, particularly, because it is unique in the human subject, and also in justice to the pains taken by the conscientious and thorough experimenter to follow it to its extreme limit.

The patient, a boy, aged eleven, was thrown from a horse, and some time afterward his symptoms became aggravated. Trephining at the point of injury was performed and a hypodermic needle introduced three times in various directions. No fluid was obtained.

He died comatose *three months after operation*.

On searching for an indication of the punctures made, none could be discovered on the surface of the brain, nor in the pia, arachnoid and dura.

On carefully making three sections of the region involved, three dark bluish lines were found extending vertically to the surface.

One, the longest, measuring a centimeter in length, nearly reached the surface, and in the hardened specimen, a slight pucker was found to mark the point which it would have reached if it continued.

The three showed the same composition, coagulated blood; at their deeper ends there was a rusty colored continuation, which microscopic examination showed to be due to the presence of a

large number of blood corpuscles on the otherwise normal cerebral tissue.

There was no spider cells nor indication of any inflammatory disturbances whatever in the cortical or medullary tissues, nor did any of the nerve cells, as far as they could be identified, exhibit structural changes. The blood vessels were normal. I could discover no certain indications to which, if any, vessel had been wounded. Undoubtedly the three delicate tubular semi-clots represented the entire extent of the permanent damage inflicted by the probe punctures.

So far as this case goes, their harmlessness is proven.

Dr. Spitzka says that his experience of injecting coarse substances into the brain of dogs has been remarkably different, and would seem to indicate an enormous individual difference.

The balance of the paper is devoted to those injections.

The conclusions drawn by the reading of Dr. Spitzka's paper is that practically hypodermic needles may be inserted with impunity, but he thinks that needles should never be introduced in the internal capsules, the contiguous ganglia or the lateral ventricles merely for explanatory purposes, *unaided* by positive clinical indications of the location of the disease.

Surely no exploration should be attempted if no proper symptoms call for it.

